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**BAND-STRUCTURE MODULATION OF NANO-STRUCTURES  
IN AN ELECTRIC FIELD**

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**ABSTRACT OF THE DISCLOSURE**

[0061] A method to electronically modulate the energy gap and band-structure of semiconducting carbon nanotubes is proposed. Results show that the energy gap of a semiconducting nanotube can be narrowed when the nanotube is placed in an electric field perpendicular to the tube axis. Such effect in turn causes changes in electrical conductivity and radiation absorption characteristics that can be used in applications such as switches, transistors, photodetectors and polaron generation. By applying electric fields across the nanotube at a number of locations, a corresponding number of quantum wells are formed adjacent to one another. Such configuration is useful for Bragg reflectors, lasers and quantum computing.

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